

Amendments to the Claims

1. (original): A method of forming a transistor device, comprising:
providing a silicon-comprising surface;
exposing the silicon-comprising surface to activated nitrogen to form a peak nitrogen concentration within the silicon-comprising surface of at least 15% (atom percent);
providing a channel region on one side of the material comprising silicon and nitrogen;
providing a transistor gate structure on a side of the material comprising silicon and nitrogen that is opposed to said one side; and
forming a pair of source/drain regions separated from one another by the channel region.
2. (original): The method of claim 1 further comprising forming a layer of silicon dioxide over the channel region, and wherein the silicon-comprising surface is a surface of the silicon dioxide.
3. (original): The method of claim 1 wherein the transistor device is a PMOS device.
4. (original): The method of claim 1 wherein the transistor device is an NMOS device.

5. (original): The method of claim 1 further comprising subjecting the material comprising silicon and nitrogen to an anneal at a temperature of about 900°C for a time of from about 10 seconds to about 60 seconds; and wherein the material comprising silicon and nitrogen is heated to the anneal temperature by rapid thermal processing at a temperature ramp rate of at least about 10°C/second.

6. (original): A method of forming a transistor device, comprising:

- providing a silicon-comprising surface;
- exposing the silicon-comprising surface to activated nitrogen for at least about 20 seconds to convert the silicon-comprising surface to a material comprising silicon and nitrogen; the activated nitrogen being formed by exposing a nitrogen-containing precursor to a plasma maintained at a power of at least about 750 watts;
- providing a channel region on one side of the material comprising silicon and nitrogen;
- providing a transistor gate structure on a side of the material comprising silicon and nitrogen that is opposed to said one side; and
- forming a pair of source/drain regions separated from one another by the channel region.

7. (original): The method of claim 6 further comprising forming a layer of silicon dioxide over the channel region, and wherein the silicon-comprising surface is a surface of the silicon dioxide.

8. (original): The method of claim 6 wherein the transistor device is a PMOS device.

9. (original): The method of claim 6 wherein the transistor device is an NMOS device.

10. (original): The method of claim 6 wherein the plasma is maintained at a power of from about 1,500 watts to about 5,000 watts.

11. (original): The method of claim 6 wherein the plasma is remote relative to the silicon-comprising surface.

12. (original): The method of claim 6 wherein the plasma contacts the silicon-comprising surface.

13. (original): The method of claim 6 further comprising maintaining the silicon-comprising surface at a temperature of from about 25°C to about 400°C during the exposing of the surface to the activated nitrogen.

14. (original): The method of claim 6 further comprising subjecting the material comprising silicon and nitrogen to an anneal at a temperature of about 900°C for a time of from about 10 seconds to about 60 seconds.

15. (original): The method of claim 6 further comprising subjecting the material comprising silicon and nitrogen to an anneal at a temperature of about 900°C for a time of from about 10 seconds to about 60 seconds; and wherein the material comprising silicon and nitrogen is heated to the anneal temperature by rapid thermal processing at a temperature ramp rate of at least about 10°C/second.

16. (original): A method of forming a transistor device, comprising:
providing a semiconductor substrate having a silicon-comprising surface;
exposing the silicon-comprising surface to activated nitrogen for at least about 20 seconds to convert the silicon-comprising surface to a material comprising silicon and nitrogen; the activated nitrogen being formed by exposing a nitrogen-containing precursor to a plasma maintained at a power of at least about 750 watts;
forming a transistor gate structure over the material comprising silicon and nitrogen; the transistor gate structure being formed proximate a channel region; the material comprising silicon and nitrogen being between the transistor gate structure and the channel region; and
forming a pair of source/drain regions separated from one another by the channel region.

17. (original): The method of claim 16 further comprising forming a layer of silicon dioxide over the channel region, and wherein the silicon-comprising surface is a surface of the silicon dioxide.

18. (original): The method of claim 16 wherein the transistor device is a PMOS device.

19. (original): The method of claim 16 wherein the transistor device is an NMOS device.

20. (original): The method of claim 16 wherein the plasma is maintained at a power of from about 1,500 watts to about 5,000 watts.

21. (original): The method of claim 16 wherein the plasma is remote relative to the silicon-comprising surface.

22. (original): The method of claim 16 wherein the plasma contacts the silicon-comprising surface.

23. (original): The method of claim 16 further comprising maintaining the silicon-comprising surface at a temperature of from about 25°C to about 400°C during the exposing of the surface to the activated nitrogen.

24. (original): The method of claim 16 further comprising subjecting the material comprising silicon and nitrogen to an anneal at a temperature of about 900°C for a time of from about 10 seconds to about 60 seconds.

25. (original): The method of claim 16 further comprising subjecting the material comprising silicon and nitrogen to an anneal at a temperature of about 900°C for a time of from about 10 seconds to about 60 seconds; and wherein the material comprising silicon and nitrogen is heated to the anneal temperature by rapid thermal processing at a temperature ramp rate of at least about 10°C/second.

26. (original): A method of forming a transistor device, comprising:

- providing a silicon-comprising material;
- defining a channel region of the transistor device beneath the silicon-comprising material;
- implanting a dopant into the channel region to a concentration of less than about 7×10^{17} atoms/cm³ as a V_t implant;
- forming a dielectric material over the channel region; the forming of the dielectric material comprising exposing the silicon-comprising material to activated nitrogen to form a peak nitrogen concentration within the exposed dielectric material of at least about 15 atom percent;
- forming a transistor gate structure over the nitrogen-comprising material; and
- forming a pair of source/drain regions separated from one another by the channel region.

27. (original): The method of claim 26 further comprising forming a layer of silicon dioxide over the channel region, and wherein the silicon-comprising material is the silicon dioxide.

28. (original): The method of claim 26 wherein the transistor device is a PMOS device.

29. (original): The method of claim 26 wherein the concentration of dopant in the V_t implant is less than 7×10^{17} atoms/cm³.

30. (original): The method of claim 26 wherein the concentration of dopant in the V_t implant is from about 1×10^{17} atoms/cm³ to 7×10^{17} atoms/cm³.

31. (original): The method of claim 26 wherein the concentration of dopant in the V_t implant is from about 1×10^{17} atoms/cm³ to 5×10^{17} atoms/cm³.

32. (original): The method of claim 26 wherein the activated nitrogen is formed from a plasma maintained at a power of from about 1,500 watts to about 5,000 watts.

33. (original): The method of claim 26 wherein the activated nitrogen is formed from a plasma that is remote relative to the silicon-comprising material.

34. (original): The method of claim 26 wherein the activated nitrogen is formed from a plasma that contacts the silicon-comprising material.

35. (original): The method of claim 26 further comprising maintaining the silicon-comprising material at a temperature of from about 25°C to about 400°C during the exposing of the material to the activated nitrogen.

36. (original): A method of forming a plurality of transistor devices, comprising:

- providing a semiconductor substrate having a silicon-comprising surface;
- defining a plurality of transistor device channel region locations beneath the silicon-comprising surface; the channel region locations being divided amongst a first group and a second group;
- covering the silicon-comprising surface over the second group of transistor device channel region locations with a masking material;
- while the masking material is over the second group of transistor device channel region locations, exposing the silicon-comprising surface over the first group of transistor device channel region locations to activated nitrogen for at least about 20 seconds to convert the silicon-comprising surface to a material comprising silicon and nitrogen; the activated nitrogen being formed by exposing a nitrogen-containing precursor to a plasma maintained at a power of at least about 750 watts;
- removing the masking material;
- after removing the masking material, forming transistor gate structures over the first and second groups of transistor device channel region locations; and
- forming a plurality of source/drain regions; individual pairs of the source/drain regions being separated from one another by individual channel region locations.

37. (original): The method of claim 36 further comprising forming a layer of silicon dioxide over the channel region locations, and wherein the silicon-comprising surface is a surface of the silicon dioxide.

38. (original): The method of claim 36 wherein the transistor devices are all PMOS devices.

39. (original): The method of claim 36 wherein at least some of the transistor devices are NMOS devices.

40. (original): The method of claim 36 wherein the plasma is maintained at a power of from about 1,500 watts to about 5,000 watts.

41. (original): The method of claim 36 wherein the plasma is remote relative to the silicon-comprising surface.

42. (original): The method of claim 36 wherein the plasma contacts the silicon-comprising surface.

43. (original): The method of claim 36 further comprising maintaining the silicon-comprising surface at a temperature of from about 25°C to about 400°C during the exposing of the surface to the activated nitrogen.

44. (new): A method of forming a transistor device, comprising:
providing a surface consisting essentially of silicon;
exposing the surface to activated nitrogen to form a silicon-nitrogen surface
having a nitrogen concentration of at least about 15% (atom percent);
providing a channel region on one side of the silicon-nitrogen surface;
providing a transistor gate structure on a side of the silicon-nitrogen surface that
is opposed to said one side; and
forming a pair of source/drain regions separated from one another by the
channel region.

A' 45. (new): The method of claim 44 wherein the surface consists of silicon.

46. (new): The method of claim 44 further comprising forming a layer of silicon
dioxide over the channel region.

47. (new): The method of claim 44 wherein the transistor device is a PMOS
device.

48. (new): The method of claim 44 wherein the transistor device is an NMOS
device.

49. (new): The method of claim 44 further comprising subjecting the silicon-nitrogen surface to an anneal at a temperature of about 900°C for a time of from about 10 seconds to about 60 seconds; and wherein the silicon-nitrogen surface is heated to the anneal temperature by rapid thermal processing at a temperature ramp rate of at least about 10°C/second.

50. (new): A method of forming a transistor device, comprising:

providing a material consisting essentially of silicon;

defining a channel region of the transistor device beneath the material;

implanting a dopant into the channel region to a concentration of less than about

A' cont'd 7×10^{17} atoms/cm³ as a V_t implant;

forming a dielectric material over the channel region; the forming of the dielectric material comprising exposing the material to activated nitrogen to form dielectric material having a peak nitrogen concentration of at least about 15 % (atom percent);

forming a transistor gate structure over the dielectric material; and

forming a pair of source/drain regions separated from one another by the channel region.

51. (new): The method of claim 50 wherein the material consists of silicon.

52. (new): The method of claim 50 further comprising forming a layer of silicon dioxide over the channel region.

53. (new): The method of claim 50 wherein the transistor device is a PMOS device.

54. (new): The method of claim 50 wherein the concentration of dopant in the V_t implant is less than 7×10^{17} atoms/cm³.

55. (new): The method of claim 50 wherein the concentration of dopant in the V_t implant is from about 1×10^{17} atoms/cm³ to about 7×10^{17} atoms/cm³.

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cont'd 56. (new): The method of claim 50 wherein the concentration of dopant in the V_t implant is from about 1×10^{17} atoms/cm³ to about 5×10^{17} atoms/cm³.

57. (new): The method of claim 50 wherein the activated nitrogen is formed from a plasma maintained at a power of from about 1,500 watts to about 5,000 watts.

58. (new): The method of claim 50 wherein the activated nitrogen is formed from a plasma that is remote relative to the material.

59. (new): The method of claim 50 wherein the activated nitrogen is formed from a plasma that contacts the material.

60. (new): The method of claim 50 further comprising maintaining the material at a temperature of from about 25°C to about 400°C during the exposing of the material to the activated nitrogen.